

Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

BULLETIN No. 7

U. S. DEPARTMENT OF AGRICULTURE
DIVISION OF ORNITHOLOGY AND MAMMALOGY

PRELIMINARY REPORT

ON THE

FOOD OF WOODPECKERS

BY

F. E. L. BEAL
ASSISTANT ORNITHOLOGIST

THE TONGUES OF WOODPECKERS

BY

F. A. LUCAS
CURATOR, DEPARTMENT COMPARATIVE ANATOMY
U. S. NATIONAL MUSEUM



WASHINGTON
GOVERNMENT PRINTING OFFICE

1895



LETTER OF TRANSMITTAL

UNITED STATES DEPARTMENT OF AGRICULTURE,

Washington, D. C., May 15, 1895.

SIR: I have the honor to transmit, as Bulletin No. 7 of this division, a preliminary report on the Food of Woodpeckers, by Prof. F. E. L. Beal, Assistant Ornithologist. The report is accompanied by a short article on the 'Tongues of Woodpeckers,' prepared at my request by Mr. F. A. Lucas, Curator of the Department of Comparative Anatomy, United States National Museum.

Respectfully,

C. HART MERRIAM,

Chief of Division of Ornithology and Mammalogy.

Hon. J. STERLING MORTON,

Secretary of Agriculture.

CONTENTS.

	Page.
The Food of Woodpeckers. By F. E. L. Beal.....	7
General remarks.....	7
Table showing food percentages.....	11
Downy Woodpecker (<i>Dryobates pubescens</i>).....	11
Hairy Woodpecker (<i>Dryobates villosus</i>).....	14
Flicker (<i>Colaptes auratus</i>).....	16
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>).....	20
Red-bellied Woodpecker (<i>Melanerpes carolinus</i>).....	25
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>).....	28
Great Pileated Woodpecker (<i>Ceophlæus pileatus</i>).....	32
Other Woodpeckers.....	33
The Tongues of Woodpeckers. By F. A. Lucas.....	35

ILLUSTRATIONS.

Text figures.

- Fig. 1. Hairy Woodpecker (*Dryobates villosus*).
 2. Flicker (*Colaptes auratus*).
 3. Red-headed Woodpecker (*Melanerpes erythrocephalus*).
 4. Yellow-bellied Sapsucker (*Sphyrapicus varius*).

Plates.

- Frontispiece. Pileated Woodpecker (*Ceophlæus pileatus*).
 Plate I. Tongues of North American Woodpeckers.
 II. Tongues of North American Woodpeckers.
 III. Tongues of North American Woodpeckers.

PRELIMINARY REPORT ON THE FOOD OF WOODPECKERS.

By F. E. L. BEAL, *Assistant Ornithologist.*

GENERAL REMARKS.

With the possible exception of the crow, no birds are subject to more adverse criticism than woodpeckers. Usually no attempt is made to discriminate between the numerous species, and little account is taken of the good they do in destroying injurious insects. The name 'Sapsucker' has been applied to two or three of the smaller kinds, in the belief that they subsist to a great extent upon the juices of trees, obtained from the small holes they make in the bark. There can be little doubt that one species, the Yellow-bellied Woodpecker (*Sphyrapicus varius*), does live to a considerable extent upon this sap. Observation does not show that other species have the same habit, but it is a difficult point to decide by dissection, as fluid contents disappear quickly from the stomach.

Many observers have testified to the good work these birds do in destroying insects, while others have spoken of harm done to fruit or grain. Both are correct within certain limits.

Field observation on the food habits of birds is attended with so many difficulties as to render it a very unreliable source from which to draw general conclusions. The most conscientious and careful person is often deceived, not only as to the quantity of a particular kind of food eaten by a bird, but as to the fact that it is eaten at all. The further difficulty of keeping a number of birds, or even a single one, under constant observation makes an estimate of relative proportions of different kinds of food impossible. When much mischief is done the fact is apparent, but there is no way to find out how much good is done during the same time. For these reasons it often happens that reports on food habits, based on observations of wild birds, not only conflict with each other but also disagree with the results obtained from stomach examinations. This last method must be taken as the court of final appeal, and it is evident that a collection of stomachs covering every month in the year, and as nearly as may be all points

of the birds' range, becomes more and more trustworthy as it increases in size; in other words, the more stomachs examined the nearer correct will be the result as to the birds' annual diet.

The present paper is merely a preliminary report, based on the examination of 679 stomachs of Woodpeckers, and representing only 7 species—all from the eastern United States. These species are the Downy Woodpecker (*Dryobates pubescens*), the Hairy Woodpecker (*D. villosus*), the Flicker or Golden winged Woodpecker (*Colaptes auratus*), the Red-headed Woodpecker (*Melanerpes erythrocephalus*), the Red-bellied Woodpecker (*Melanerpes carolinus*), the Yellow-bellied Woodpecker (*Sphyrapicus varius*), and the Great Pileated Woodpecker (*Ceophlæus pileatus*). Examination of their stomachs shows that the percentage of animal food (consisting almost entirely of insects) is greatest in the Downy, and grades down through the Hairy, Flicker, Pileated, Redhead, and Yellow-bellied to the Red-bellied, which takes the smallest quantity of insects. Prof. Samuel Aughey stated that all of these species except the Pileated (which was not present) fed upon locusts or grasshoppers during the devastating incursions of these insects in Nebraska. The vegetable matter, of course, stands in inverse order. The greatest quantity of mineral matter (sand) is taken by the Flicker, somewhat less by the Redhead, very little by the Downy and Hairy, and none at all by the Yellow-bellied and Pileated.

The stomachs of all of the 7 species except the Redhead and Red-bellied contained the substance designated as 'cambium' in the accompanying list of vegetable food. This is the layer of mucilaginous material lying just inside of the bark of trees, and from which both bark and wood are formed. It is supposed by many to be the main object sought by woodpeckers. Except in the case of a single species the stomach examination does not bear out this view, since cambium, if present at all, was in such small quantities as to be of no practical importance. The Yellow-bellied Woodpecker, however, is evidently fond of this substance, for in the stomachs examined it formed 23 percent of the whole food of the year. It was found in 37 stomachs, most of which were taken in April and October. Of 18 stomachs collected in April, 16 contained cambium, and one of the remaining contained no vegetable food whatever. Moreover, as the true cambium is a soft and easily digested substance it is probable that what is usually found in the stomachs is only the outer and harder part, which therefore represents a much larger quantity. The extent of the injury done by destroying cambium must depend on the quantity taken from individual trees. It is well known that woodpeckers sometimes do serious harm by removing the outer bark from large areas on the trunks of fruit trees. The rings of punctures often seen around the trunks of apple trees are certainly the work of the Sapsucker, though sometimes attributed to the Downy and Hairy Woodpeckers. But the bird is not sufficiently numerous in most parts of the country to do much damage.

It is a difficult task to summarize the results of the investigations herein detailed, more especially if an attempt is made to decide as to the comparative merits or demerits of each particular species. The stomach examinations do not always corroborate the testimony received from observers, and many no doubt will be inclined to think they have seen more harm done by some members of this family of birds than is shown by the data here published. If birds are seen feeding repeatedly on a certain kind of food the inference is that they are particularly fond of it, but the truth may be that they are eating it because they can find nothing they like better, and that a collection of their stomachs from many localities would show only a small percentage of this particular food.

In reviewing the results of these investigations and comparing one species with another, without losing sight of the fact that comparative good is not necessarily positive good, it appears that of 7 species considered the Downy Woodpecker is the most beneficial. This is due in part to the great number of insects it eats and in part to the nature of its vegetable food, which is of little value to man. Three-fourths of its food consists of insects, and few of these are useful kinds. Of grain, it eats practically none. The greatest sin we can lay at its door is the dissemination of poison ivy.

The Hairy Woodpecker probably ranks next to the Downy in point of usefulness. It eats fewer ants, but a relatively larger percentage of beetles and caterpillars. Its grain-eating record is trifling; 2 stomachs taken in September and October contained corn. For fruit, it seeks the forests and swamps, where it finds wild cherries, grapes, and the berries of dogwood and Virginia creeper. It eats fewer seeds of the poison ivy and poison sumac than the Downy.

The Flicker eats a smaller percentage of insects than either the Downy or the Hairy Woodpecker, but if eating ants is to be considered a virtue, as we have endeavored to show, then surely this bird must be exalted, for three-fourths of all the insects it eats, comprising nearly half of its whole food, are ants. It is accused of eating corn; how little its stomach yields is shown on another page. Fruit constitutes about one-fourth of its whole fare, but the bird depends on nature and not on man to furnish the supply.

Judged by the results of the stomach examinations of the Downy and Hairy Woodpecker and Flicker it would be hard to find three other species of our common birds with fewer harmful qualities. Not one of the trio shows a questionable trait, and they should be protected and encouraged in every possible way. Fortunately, only one, the Flicker, is liable to destruction, and for this bird each farmer and landowner should pass a protective law of his own.

The Redhead makes the best showing of the seven species in the kinds of insects eaten. It consumes fewer ants and more beetles than any of the others, in this respect standing at the head, and it has a pronounced taste for beetles of very large size. Unfortunately, however, its

fondness for predaceous beetles must be reckoned against it. It also leads in the consumption of grasshoppers; these and beetles together forming 36 percent of its whole food. The stomachs yielded enough corn to show that it has a taste for that grain, though not enough to indicate that any material damage is done. It eats largely of wild fruit, and also partakes rather freely of cultivated varieties, showing some preference for the larger ones, such as apples. In certain localities, particularly in winter, it feeds extensively on beechnuts. No charge can be brought against it on the score of injuring trees by pecking.

The Red-bellied Woodpecker is more of a vegetarian than any of the others. In certain localities in Florida it does some damage to oranges, but the habit is not general. On the other hand, it eats quantities of ants and beetles.

The Yellow-bellied Woodpecker seems to show only one questionable trait, that of a fondness for the sap and inner bark of trees. Both field observations and the contents of the stomachs prove this charge against it, but it is not probable that forest trees are extensively injured, or that they ever will be, for aside from the fact that the bark of many trees would be unpalatable an immense number of birds would be required to do serious damage. But with fruit trees the case is different. Their number is limited, and there are no superfluous ones as in the forest. In localities where the bird is abundant considerable harm may be done to apple trees, which appear to be pleasing to its taste.

The Pileated Woodpecker is more exclusively a forest bird than any of the others, and its food consists of such elements as the woods afford, particularly the larvæ of wood-boring beetles, and wild fruits. The species is emphatically a conservator of the forests.

In describing the stomach contents of the different woodpeckers a quantity of material is classed under the term 'rubbish.' The great bulk of this stuff is rotten wood and bark, picked up in digging for insects in decayed timber, and apparently swallowed accidentally with the food. If the 6 woodpeckers which had eaten rotten wood are compared with respect to the quantity of this material contained in the stomachs it is found that the Hairy Woodpecker stands at the head with 8 percent, the Downy next with 5, the Flicker with 3, the Redhead and Yellow-bellied with 1 percent each, and the Pileated with only a trace. From this it appears that the Hairy Woodpecker is preeminently a *woodpecker*, while the Redhead and Yellow-belly do much less of this kind of work. The difference in habit is obvious to the most casual observer. The Redhead is ordinarily seen upon a fence post or telegraph pole hunting for insects that alight on these exposed surfaces, and watching for others that fly near enough to be captured in mid-air. Unlike other woodpeckers, he is seldom seen digging at a rotten branch except in spring, when he prepares a home for the family he intends to rear. The Yellow-bellied, as will be shown presently, does much wood (or bark) pecking. but of another kind.

The following tables show the food percentages of the stomachs examined:

Percentages of food of 7 species of woodpeckers.

Name of species.	No. of stomachs examined.	Percentage of stomach contents.			Percentage of different insects.						
		Animal.	Vegetable.	Mineral.	Hymenoptera (ants).	Colcoptera (beetles).	Lepidoptera (caterpillars).	Orthoptera (grass-hoppers).	Hemiptera (bugs, plant lice).	Diptera (flies).	Spiders and myriapods.
Downy Woodpecker (<i>Dryobates pubescens</i>)	140	74	25	1	23	24	16	3	4	1	3
Hairy Woodpecker (<i>Dryobates villosus</i>)	82	68	31	1	17	24	21	Trace.	2	.....	4
Flicker (<i>Colaptes auratus</i>)	230	56	39	5	43	10	1	1	Trace.	Trace.	1
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	101	50	47	3	11	31	1	5	1	.....	1
Red-bellied Woodpecker (<i>Melanerpes carolinus</i>)	22	26	74	Trace.	11	10	4	Trace.	Trace.	.....	Trace.
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	81	50	50	.....	36	5	2	1	1	3	2
Pileated Woodpecker (<i>Ceophlaeus pileatus</i>)	23	51	49	.....	30	15	2	Trace.	4	Trace.	Trace.

Relative proportions of larval and adult beetles (Colcoptera) in stomachs of 7 species of woodpeckers.

Name of species.	Number of stomachs examined.	Number containing adult Colcoptera.	Number containing larval Colcoptera.	Percentage of whole number.		Percentage of stomach contents.	
				Adult.	Larvæ.	Adult.	Larvæ.
Downy Woodpecker (<i>Dryobates pubescens</i>)	140	50	60	38	43	11	13
Hairy Woodpecker (<i>Dryobates villosus</i>)	82	27	46	33	56	6	18
Flicker (<i>Colaptes auratus</i>)	230	67	18	25	8	8	2
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	101	83	.....	82	.....	31	.....
Red-bellied Woodpecker (<i>Melanerpes carolinus</i>)	22	6	4	27	18	7	3
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	81	15	1	19	1	5	Trace.
Pileated Woodpecker (<i>Ceophlaeus pileatus</i>)	23	4	12	17	52	2	1

DOWNY WOODPECKER.

(*Dryobates pubescens*.)

This little woodpecker is the smallest, not only of the 7 species under consideration, but of all those inhabiting the United States. He is also one of the most familiar, being no stranger to the shade trees about houses and parks, while his fondness for orchards is well known. He is so quiet and unobtrusive that the first notice one has of his presence may be a gentle tapping or scratching on the limb of a tree within two or three yards of one's head, where our diminutive friend

has discovered a decayed spot inhabited by wood-boring larvæ or a colony of ants.

One hundred and forty stomachs of the Downy Woodpecker have been examined. They were collected during every month in the year and in 21 States, the District of Columbia, Ontario, and New Brunswick. A few of the western subspecies (*Dryobates pubescens gairdneri*), from British Columbia, have been included. The stomachs contained 74 percent of insects, 25 percent of vegetable matter, and 1 percent of mineral matter or sand. The insects belong to the following orders: Ants (*Hymenoptera*), beetles (*Coleoptera*), bugs (*Hemiptera*), flies (*Diptera*), caterpillars (*Lepidoptera*), and grasshoppers (*Orthoptera*). Spiders and myriapods were also present. While all of these were eaten to some extent, they appear in widely different proportions. The ants constitute almost one-third of all the animal food, or about 23 percent of the whole, indicating a very decided taste for this rather acid and highly flavored article of diet. Beetles stand a little higher in order of importance, amounting to about one-third of the entire insect food, or somewhat more than 24 percent of all. Many of these belong to the family of May beetles, a few were the predaceous ground beetles, but by far the greatest number were wood-boring larvæ, a fact showing that this little bird while securing his dinner is doing good work for the forest. One-fifth of the animal food, or 16 percent of the total, consists of caterpillars, many of which apparently are wood-boring species; others are kinds that live on stems and foliage. Among insects the most interesting are the bugs (*Hemiptera*), which are represented in the stomachs by several species, notably by plant lice (*Aphides*), which in several instances were found in considerable quantities, amounting to 4 percent of the whole food. From the minute size and very perishable nature of these insects it is evident that they must disappear from the stomach in a very short time, and it is fair to infer that many more were eaten than shown by the food remains. Spiders, including harvestmen or daddy longlegs, were eaten freely, and amounted to nearly one-tenth of the whole. A few bits of snail shell were found in one stomach.

Eleven Downy Woodpeckers from Kansas collected in winter (December) deserve special notice. Eight of them had eaten the eggs of grasshoppers to an average extent of 10 percent of all their food. This, besides being in itself a good work, emphasizes the fact that this bird resorts to the ground for food in case of necessity.

Prof. Samuel Aughey examined 4 stomachs of the Downy Woodpecker in Nebraska, all of which contained grasshoppers.

The late Dr. Townend Glover, entomologist of the Department of Agriculture, states that the stomach of a Downy Woodpecker shot in February "was filled with black ants." He states further, "On one occasion a Downy Woodpecker was observed by myself making a number of small, rough-edged perforations in the bark of a young ash

tree, and upon examining the tree when the bird had flown it was found that wherever the bark had been injured the young larvæ of a wood-eating beetle had been snugly coiled underneath and had been destroyed by the bird.”¹

In the matter of vegetable diet, the taste of the Downy Woodpecker is varied, prompting him to eat a little of a good many things rather than a large quantity of any one. The following is a list of the vegetable substances that were identified:

Grain:

Indeterminable.

Fruit:

Dogwood berries (*Cornus florida*), (*C. alternifolia*), and (*C. asperifolia*).

Virginia creeper berries (*Parthenocissus*² *quinquefolia*).

June or service berries (*Amelanchier canadensis*).

Strawberries (*Fragaria*).

Pokeberries (*Phytolacca decandra*).

Apples.

Unidentified.

Miscellaneous:

Poison ivy seeds (*Rhus radicans*).

Poison sumac seeds (*Rhus vernix*).

Harmless sumac seeds (*Rhus sp.?*).

Mullein seeds (*Verbascum thapsus*).

Hornbeam seeds (*Ostrya virginiana*).

Nut, unidentified.

Flower petals and buds.

Galls.

Cambium.

Seeds, unidentified.

Rubbish.

Material believed to be fragments of grain was found in 2 stomachs but the quantity was so small that it may be dismissed without further comment. Fruit is by far the largest item of vegetable diet, forming one-tenth of the whole food. Strawberry seeds were found in only 1 stomach, apple pulp was supposed to be identified in 2, and the other varieties mentioned in the table were distributed in about the same proportion; so that no great economic interest can attach to this part of the birds' diet. The seeds and other things included under the head 'Miscellaneous' constitute about one-twelfth of the total food. Seeds of poison ivy were found in 20 stomachs and poison sumac in 1. These plants, far from being harmful to the birds, seem to form a very agreeable article of diet, and are eaten by many species. Unfortunately these seeds are protected by a hard, horny covering which successfully resists the action of the stomach, so that they pass through the alimentary canal uninjured. It is probable that we owe to birds, more than any other agency, the presence of these noxious plants beside fences, copses, and hedge rows. The remaining vegetable food, about 5 percent, was classed as rubbish, and will be discussed in connection with some of the other woodpeckers.

No beechnuts were found in any of the stomachs examined, but Dr. Merriam informs me that in northern New York they feed extensively on this nut, particularly in fall, winter, and early spring. On April 5,

¹U. S. Agr. Rept. for 1865, 1866, p. 37-38.

²Commonly called *Ampelopsis*. See (List of Pteridophyta and Spermatophyta), prepared by a committee of the Botanical Club of the A. A. A. S., 1893-94, which has been followed in all questions of botanical nomenclature.

1878, Dr. Merriam "shot 4 Downy Woodpeckers all of whose gizzards were full of beechnuts and contained nothing else. The birds were often seen on moss-covered logs, and even on the ground, searching for the nuts exposed by the melting snow." Dr. Merriam states also that he has seen this woodpecker in the fall eat the red berries of the mountain ash.

HAIRY WOODPECKER.

(*Dryobates villosus.*)

This woodpecker is as common as the Downy in most parts of the United States, and to the ordinary eye can only be distinguished by its greater size, its color and markings being almost exactly the same.



FIG. 1.—Hairy Woodpecker.

The Hairy is a noiser bird, however, often making his presence known by loud calls and obtrusive behavior and by rapid flights from tree to tree. Like the Downy, he has been accused of depredations on fruit, but the stomachs examined do not show that cultivated varieties form

any considerable part of his fare. Beside the general resemblance between the two birds there is also a remarkable similarity in their food habits, as shown by the stomach contents; the greatest difference being that the Hairy eats a smaller percentage of insects than the Downy. Eighty-two stomachs have been examined, collected during every month in the year, except February; and coming from 19 States, the District of Columbia, Ontario, New Brunswick, and Nova Scotia; though most were from the northern United States. The proportion of different kinds of food is as follows: Animal, 68 percent; vegetable, 31 percent; mineral, 1 percent. The insect material was made up of ants, beetles, caterpillars, bugs, and grasshoppers. Spiders and myriapods also were present. An inspection of the percentages shows that ants are not so highly prized by the Hairy as by the Downy, since they constitute only about 17 percent of the whole food, or one-fourth of the insect portion. Beetles, both larval and adult, stand relatively higher than in the case of the Downy, comprising 24 percent of all food, or more than one-third of the insect matter. Caterpillars were eaten in greater quantities, both actually and relatively, amounting to 21 percent of the whole food, or more than one-third of all the insect material. Spiders are well represented, and aggregate nearly 6 percent of the entire food. Among the miscellaneous insects were a few aphids or plant lice. Grasshoppers were found in only 1 stomach, but Professor Aughey found them in 4 out of 6 stomachs examined by him in Nebraska.

Mr. F. M. Webster states that he has seen a Hairy Woodpecker successfully peck a hole through the parchment-like covering of the cocoon of a *Cecropia* moth, devouring the contents. On examining more than 20 cocoons in a grove of boxelders he found only 2 uninjured.

The Hairy Woodpecker selects a somewhat larger variety of vegetable food than the Downy, though of the same general character. The following list of fruits and seeds found in the stomachs does not indicate that the bird visits orchards and gardens for fruit so much as swamps and thickets, where wild grapes, woodbine, and dogwood abound:

Grain:

Corn.

Fruit:

Dogwood berries (*Cornus florida* and *C. asperifolia*).Virginia creeper berries (*Parthenocissus quinquefolia*).June or service berries (*Amelanchier canadensis*).Spice berries (*Benzoin benzoin*).Sourgum berries (*Nyssa aquatica*).Wild black cherries (*Prunus serotina*).Choke cherries (*Prunus virginiana*).Wild grapes (*Vitis cordifolia*).

Fruit—Continued:

Blackberries or raspberries (*Rubus*).Pokeberries (*Phytolacca derandra*).

Unidentified.

Miscellaneous:

Poison ivy seeds (*Rhus radicans*).Poison sumac seeds (*Rhus vernix*).Harmless sumac seeds (*Rhus glabra*).Barngrass seeds (*Chamaeraphis. sp?*).

Hazelnuts.

Seeds unidentified.

Cambium.

Spruce foliage (*Picea*).

Rubbish.

The only grain discovered was corn, which was found in 2 stomachs. In one case it was green corn in the milk, but this is hardly sufficient to prove the habit of eating corn. Fruit aggregates a little more than 11 percent of the food of the species, and is fairly distributed among all the items in the above list. Since blackberries are the only kind of cultivated fruit found in the stomachs, and since they grow wild in abundance, it is evident that the Hairy Woodpecker does not at present cause any great damage by his fruit-eating habits. The substances in the miscellaneous list form about 11 percent of the whole food, and are practically of the same character as in the case of the Downy. Poison ivy seeds were eaten by 7 birds, and poison sumac by only 1, so that not so many seeds of these undesirable shrubs are distributed by the Hairy as by the Downy. The weed seeds in the stomachs were few in number, but in Iowa both the Hairy and the Downy Woodpeckers feed largely on weed seeds in winter, stomachs taken then containing little else. Rubbish amounts to about one-twelfth of all their food, which is the largest percentage shown by any species.

Dr. Merriam informs me that in northern New York the Hairy Woodpecker, like the other woodpeckers of the Adirondack region, feeds largely on beechnuts. In late fall, winter, and early spring following good yields of beechnuts the nuts form the principal food of the woodpeckers.

FLICKER.

(*Colaptes auratus*.)

This bird, one of the largest and best known of our woodpeckers, is more migratory than either the Hairy or Downy, in winter being scarce or absent from its breeding range in the Northern States, where it is very abundant in summer and early fall. The Yellow-shafted Flicker is distributed throughout the United States east of the Rocky Mountains. In the West it is replaced by the Red-shafted Flicker, which may be considered the same so far as food habits are concerned. Under one or the other of its various titles of Flicker, Golden-winged Woodpecker, High-holder, Yellow-hammer, Pigeon Woodpecker, and Hairy-wicket, it is known to every farmer and schoolboy and, unfortunately, to certain so-called sportsmen also, for this is the one woodpecker that is often seen in city markets. In most places it is a much shyer bird than either of the preceding, and while it frequents the farm and approaches buildings freely it keeps more in the tops of the trees and does not allow so near an approach of its greatest enemy, man. This is particularly true in the northeastern part of the country, where large bags of Pigeon Woodpeckers are annually made among the wild cherry trees in which the birds feed. The Flickers soon learn whom they have to fear, and such knowledge seems to be hereditary. They are very prolific, rearing from six to ten young at a brood, and so keep reasonably abundant in most parts of the country. The Flicker is the most

terrestrial of all the woodpeckers, in spite of his high-perching and high-nesting proclivities, and may often be seen walking about in the grass like a meadow lark.

In the investigation of its food habits 230 stomachs were examined, taken in every month of the year, although January and February have but 1 each. They were collected in 22 States, the District of Columbia, and the Northwest Territory, and are fairly well distributed over the region east of the Rocky Mountains. They contained 56 per cent of animal matter, 39 percent of vegetable, and 5 percent of mineral. It will be seen that the quantity of animal or insect material is less than in either of the preceding species, and the mineral matter somewhat greater. The following orders of insects were represented:



FIG. 2.—Flicker.

Ants (*Hymenoptera*), beetles (*Coleoptera*), bugs (*Hemiptera*), grasshoppers and crickets (*Orthoptera*), caterpillars (*Lepidoptera*), Mayflies (*Ephemera*) and white ants (*Isoptera*). Spiders and myriapods also were present. An inspection of this insect matter shows the rather remarkable fact that more than three-fourths of it, or 43 percent of the whole food, consists of ants. If the mineral matter is thrown out as not being properly food, we find that more than 45 percent of the Flicker's food for the year consists of ants. Among the stomachs examined several contained nothing but ants. In two of these the actual number of ants present in each stomach exceeded 3,000. These were mostly small species that live in burrows in the earth, so that it is evident that when Flickers are seen upon the ground they are usually in search of

ants, although the other insects found in the stomachs account in part for this ground-feeding habit. Prof. Samuel Aughey examined 8 stomachs of Flickers in Dixon County, Nebr., in June, 1865. All of them contained grasshoppers, and the number in each stomach varied from 15 to 48.

As a large part of the food of the 7 woodpeckers studied consists of ants, the question may be asked whether the birds are doing good or harm by destroying them. There are so many different species of these insects, and they have such widely different habits, that it is difficult to make any assertion that will apply to all, but it is safe to say that many kinds are decidedly harmful, because they attend, protect, and help to spread plant, root, and bark lice of various species. These lice are among the worst enemies of plant life, and everything which tends to prevent their destruction is prejudicial to the interests of agriculture. Other species of ants destroy timber by burrowing in it; still others, in warmer climates, do much harm to fruit trees by cutting off the leaves and undermining the ground. Many species infest houses and other buildings. Apparently, then, birds do no harm in destroying ants, but on the contrary probably do much good by keeping within bounds these insect pests, whose greater abundance would be a serious injury to man. The Flicker takes the lead in this work, eating ants to the extent of nearly half of his whole food.

Next in importance to ants are beetles, which form about 10 percent of all the food, less than half the quantity eaten by the Hairy and Downy Woodpeckers. Among these were May beetles and their allies, and a few snapping beetles, but the greater number were Carabids or predaceous ground beetles. Most of these were in the adult form, but some larvæ of tiger beetles were identified. As these last live in burrows in the sand, and as Carabids live upon the ground, their presence in the stomachs again points to the terrestrial habits of the bird. The same is true of the grasshoppers and crickets. None of the other insects mentioned were eaten to any great extent, the whole aggregating only about 3 percent. Two stomachs contained each a single bedbug. Where they were obtained it is as difficult to surmise as it is to understand what motive could prompt the bird to swallow such an insect. Five stomachs contained each a few bits of snail shell.

In the matter of vegetable diet the Flicker has the most extensive list of any of the 7 woodpeckers, and many of the articles of food can only be obtained on the ground or among low bushes. Following is a list of all the vegetable substances identified in the Flicker's stomach:

Grain:

- Corn.
- Buckwheat.

Fruit:

- Dogwood berries (*Cornus florida* and *C. asperifolia*).
- Virginia creeper berries (*Parthenocissus quinquefolia*).
- Hackberries (*Celtis occidentalis*).
- Black alder berries (*Ilex verticillata*).
- Sourgum berries (*Nyssa aquatica*).
- Cat or greenbrier berries (*Smilax glauca*).
- Blueberries (*Vaccinium* sp.).
- Huckleberries (*Gaylussacia* sp.).
- Pokeberries (*Phytolacca decandra*).
- June or service berries (*Amelanchier canadensis*).
- Spice berries (*Benzoin benzoin*).
- Elderberries (*Sambucus canadensis* and *S. pubens*).
- Mulberries (*Morus*).
- Wild grapes (*Vitis cordifolia*).
- Wild black cherries (*Prunus serotina*).
- Choke cherries (*Prunus virginiana*).
- Cultivated cherries.

Fruit—Continued.

- Blackberries (*Rubus*)
- Unidentified.

Miscellaneous:

- Poison ivy seeds (*Rhus radicans*).
- Poison sumac seeds (*Rhus vernix*).
- Harmless sumac seeds (*Rhus copallina* and *R. glabra*).
- Waxberries or bayberries (*Myrica cerifera*).
- Juniper berries (*Juniperus virginiana*).
- Knotweed or smartweed (*Polygonum convolvulus*, *P. persicaria*, *P. lapathifolium*).
- Clover seed (*Trifolium repens*).
- Grass seed (*Phleum*).
- Pigweed seed (*Chenopodium*).
- Mullein seed (*Verbascum thapsus*).
- Ragweed (*Ambrosia*).
- Magnolia seed (*Magnolia grandiflora*).
- Acorns (*Quercus*).
- Seed unidentified.
- Cambium.
- Rubbish.

Of the two kinds of grain in the above list corn was identified in 5 stomachs, buckwheat in 1. One of the stomachs containing corn was taken in March and the bird had made a full meal of it, probably because he could get nothing else. Three of the others were collected in September, and the corn was evidently 'in the milk.' The fifth was taken in October, and is of a somewhat doubtful nature.

The Department of Agriculture has received a number of reports that implicate woodpeckers in damage done to crops. The only one of any consequence is from Dr. E. S. C. Foster, of Russell County, Kans., who states that the Red-headed and Golden-winged Woodpeckers damage corn in the roasting ear by tearing open the husks. He does not say for what purpose the husks are torn open, though some observers have declared that the object is to obtain the grub which sometimes infests the ear. The testimony furnished by the stomachs does not indicate that the Golden-wing has much to do with corn stealing, for it appears that out of 98 stomachs taken in September and October, the season of harvest, only 4 contained corn at all, and these in quantities ranging from 4 to 30 percent of the stomach contents. The buckwheat was eaten in September. The Flicker has a rich and varied list of fruit, embracing at least 20 different kinds, nearly all of which are wild.

The two items of grain and fruit together constitute about 25 percent of the whole food, the grain, however, being of little consequence. With all this fruit eating, the Flicker trespassed upon man's preserves for cherries only, and these were found in only 1 stomach. Several

observers, however, have testified that some damage is done. T. J. Parrish, of Cooke County, Tex., states that the Yellow-hammers and small woodpeckers feed on peaches, plums, grapes, and cherries.

Miscellaneous vegetable substances aggregate a little more than 10 percent of the whole food of this bird, and like the fruit list, consist of a variety of elements. Poison ivy seeds were found in 20 stomachs, poison sumac in 5, and bayberries in 14. All these seeds are coated with a white substance resembling wax, and while the quantity is small compared with the size of the seeds, it is probably rich in nutritive properties, for the seeds are a favorite article of winter diet with many birds. A number of weed seeds were found, and if eaten in considerable quantities would be a great argument in the bird's favor, but unfortunately they occurred in only one or two stomachs each, and so may be considered as merely picked up experimentally in default of something better. It is possible that a series of stomachs taken in the winter months might show a larger percentage, as has been observed in the case of other species of birds, including at least 2 woodpeckers. The mineral element of the stomach contents is larger in the Flicker than any of the others, forming 5 percent of the whole, and consisting principally of fine sand. It was noticed that the greatest quantity was present in stomachs containing ants, showing that the sand was picked up accidentally in gathering the ants from their hillocks.

RED-HEADED WOODPECKER.

(*Melanerpes erythrocephalus*.)

The handsome Redhead inhabits suitable localities throughout the United States east of the Rocky Mountains, but is only casual in New England. He is a familiar bird on telegraph poles and fence posts, and seems to prefer these rather unpicturesque objects to other apparently more fruitful hunting grounds. He feeds largely on insects found upon these bare surfaces, but the vegetable matter in his stomach shows that he forages in other pastures also.

Fifty years ago Giraud stated that on Long Island the Red-headed Woodpecker arrives early in April, and during the spring "subsists chiefly on insects. In the summer it frequents the fruit trees, ripe cherries and pears seeming to be a favorite repast. In the fall it feeds on berries and acorns, the latter at this season forming a large portion of its food."¹

In its fondness for mast it resembles its relative, the California Woodpecker, whose habit of storing acorns is one of its most conspicuous traits. In the northern part of its range, where the oak is replaced by the beech, the Redhead makes the beechnut its principal food. Dr. C. Hart

¹ Birds of Long Island, by J. P. Giraud, jr., 1844, p. 180.

Merriam has given much testimony under this head.¹ He states that in northern New York, where it is one of the commonest woodpeckers, it subsists almost exclusively on beechnuts during the fall and winter, even picking the green nuts before they are ripe and while the trees are still covered with leaves. He has shown that these woodpeckers invariably remain throughout the winter after good nut yields and migrate whenever the nut crop fails. He says: "Gray Squirrels, Red-headed Woodpeckers, and beechnuts were numerous during the winters



FIG. 3.—Red-headed Woodpecker.

of 1871-72, 1873-74, 1875-76, 1877-78, 1879-80, 1881-82, 1883-84, while during the alternate years the squirrels and nuts were scarce and the woodpeckers altogether absent;" and adds that in Lewis County, N. Y., "a good squirrel year is synonymous with a good year for *Melanerpes*, and vice versa." In early spring, following nut years, when the melting snow uncovers the ground, they feed on the beechnuts that were buried during winter. On April 5, 1878, at Locust Grove, N. Y., he shot 6 whose gizzards contained beechnuts and nothing else.

¹ Birds of Connecticut, 1877, p. 66; Bull. Nuttall Ornith. Club, Vol. III, 1878, p. 124; Mammals of the Adirondacks, 1884, p. 226.

In an interesting article in the *Auk*,¹ Mr. O. P. Hay says that in central Indiana during a good beechnut year, from the time the nuts began to ripen, the Redheads were almost constantly on the wing, passing from the beeches to some place of deposit. They hid the nuts in almost every conceivable situation. Many were placed in cavities in partly decayed trees; and the felling of an old beech was certain to provide a feast for the children. Large handfuls were taken from a single knot hole. They were often found under a patch of raised bark, and single nuts were driven into cracks in the bark. Others were thrust into cracks in gateposts; and a favorite place of deposit was behind long slivers on fence posts. In a few cases grains of corn were mixed with beechnuts. Nuts were often driven into cracks in the ends of railroad ties; and the birds were often seen on the roofs of houses pounding nuts into the crevices between the shingles. In several instances the space formed by a board springing away from a fence was nearly filled with nuts, and afterwards pieces of bark and wood were brought and driven over the nuts as if to hide them from poachers.

In summer Dr. Merriam has seen the Redheads "make frequent sallies into the air after passing insects, which were almost invariably secured." He has also seen them catch grasshoppers on the ground in a pasture.

Dr. A. K. Fisher saw several Red-headed Woodpeckers feeding on grasshoppers in the streets at Miles City, Mont., in the latter part of July, 1893. Several of the birds were seen capturing these insects near the hotel throughout the greater part of the forenoon. From a regular perch on top of a telegraph pole or cottonwood they descended on their prey, sometimes eating them on the ground, but more often returned to their former post to devour them.

The following interesting observation was made by Dr. G. S. Agersborg, of Vermillion, S. Dak.:²

Last spring, in opening a good many birds of this species with the object of ascertaining their principal food, I found in their stomachs nothing but young grasshoppers. One of them, which had its headquarters near my house, was observed making frequent visits to an old oak post, and on examining it I found a large crack where the woodpecker had inserted about 100 grasshoppers of all sizes (for future use, as later observation proved), which were put in without killing them, but they were so firmly wedged in the crack that they in vain tried to get free. I told this to a couple of farmers, and found that they had also seen the same thing, and showed me posts which were used for the same purpose. Later in the season the woodpecker whose station was near my house, commenced to use his stores, and to-day (February 10), there are only a few shriveled-up grasshoppers left.

Mr. Charles Aldrich, of Webster City, Iowa, states that he saw a Red-headed Woodpecker catching grasshoppers on the prairie half a mile from timber. In Nebraska grasshoppers were found in 4 out of 6 stomachs examined by Prof. Samuel Aughey.

¹ *Auk*. Vol. IV, 1887, pp. 194, 195.

² *Bull. Nuttall Ornith. Club*, Vol. III, 1878, p. 97.

Besides depredations upon fruit and grain, this woodpecker has been accused of destroying the eggs of other birds and even of killing the young; and from Florida comes a report that it enters poultry houses and sucks the eggs of domestic fowls. Mr. Charles Aldrich, of Webster City, Iowa, says that a Red-headed Woodpecker was seen to kill a duckling with a single blow on the head, and then to peck out and eat the brains.¹ In view of such testimony remains of eggs and young birds were carefully looked for in the stomachs examined, but pieces of eggshell were found in only 1 stomach of the Flicker and 2 of the Redhead.

A very unusual trait has been recorded by Dr. Howard Jones, of Circleville, Ohio. Dr. Jones says he has seen the Red-headed Woodpecker steal the eggs of eave swallows, and in cases where the necks of the nests were so long that the eggs were out of reach the woodpecker made a hole in the walls of the nest and so obtained the contents. In a colony of swallows containing 'dozens' of nests not a single brood of young was raised. One of the woodpeckers also began to prey upon hens' eggs, and was finally captured in the act of robbing the nest of a sitting hen.²

No traces of young birds or of any other vertebrates were discovered in the stomachs of any of the 7 species under consideration, except bones of a small frog which were found in the stomach of a Red-bellied Woodpecker (*Melanerpes carolinus*) from Florida.

The Redhead has been accused of doing considerable damage to fruit and grain, and both charges are fairly well sustained. In northern New York Dr. Merriam has seen it peck into apples on the tree, and has several times seen it feed on choke cherries (*Prunus virginiana*).

Mr. August Jahn, of Pope County, Ark., writes that it has damaged his corn to the amount of \$10 or \$15, and Dr. J. R. Mathers, of Upshur County, W. Va., says that the same species feeds on cherries, strawberries, raspberries, and blackberries, and that its depredations are sometimes serious. According to Mr. Witmer Stone, of Germantown, Pa., Red-headed Woodpeckers have been observed to strip a blackberry patch of all of its fruit. Mr. W. B. McDaniel, of Decatur County, Ga., also reports that the Sapsucker and Redhead eat grapes and cherries, the loss being sometimes considerable. These examples show the nature of the evidence contributed by eye-witnesses, the accuracy of whose observations there is no reason to doubt. That the stomach examinations do not reveal more damaging points against the species is not surprising, for a person seeing a bird eating his choice fruit, or in some other way inflicting damage, is more impressed by it than by the sight of a hundred of the same species quietly pursuing their ordinary vocations. Thus an occasional act is taken as a characteristic habit.

¹Am. Nat., Vol. VI, No. 5, May, 1877, p. 308.

²Ornithologist and Oologist, Vol. VIII, No. 7, 1883, p. 56.

One hundred and one stomachs of the Redhead were examined from specimens collected throughout the year, although the bird is not generally abundant in the Northern States during the winter months. The specimens were taken in 20 States, the District of Columbia and Canada, and are fairly well distributed over the whole region east of the Rocky Mountains. The contents of the stomachs consisted of: Animal matter, 50 percent; vegetable matter, 47 percent; mineral matter, 3 percent. The animal and vegetable elements are nearly balanced, and the mineral element is larger than in any except the Flicker. The insects consist of ants, wasps, beetles, bugs, grasshoppers, crickets, moths, and caterpillars. Spiders and myriapods also were found. Ants amounted to about 11 percent of the whole food, which is the smallest showing of any of the 7 species under consideration, and is in harmony with the habits of the bird, which collects its food upon exposed surfaces where ants do not often occur. Beetle remains formed nearly one-third of all food, the highest record of any one of the 7 woodpeckers. The families represented were those of the common May beetle (*Lachnosterna*), which was found in several stomachs, the predaceous ground beetles, tiger beetles, weevils, and a few others. Among the May beetle family is a rather large, brilliant green beetle, known to entomologists as *Allorhina nitida*, but commonly called by the less dignified name of 'June bug.' It is very common during the early summer in the Middle and Southern States, but less so at the North. This insect was found in 11 stomachs, and 5 individuals were identified in a single stomach, which would seem an enormous meal for a bird of this size. Another large beetle eaten by this woodpecker is the fire-ground beetle (*Calosoma calidum*), a predaceous beetle of large size and vile odor. *Passalus cornutus*, one of the staghorns, a large insect, was also found, as well as a pair of mandibles belonging to *Prionus brevicornus*, one of the largest beetles in the United States. A preference for large beetles is one of the pronounced characteristics of this woodpecker. Weevils were found in 15 stomachs, and in several cases as many as 10 were present. Remains of Carabid beetles were found in 44 stomachs to an average amount of 24 percent of the contents of those that contained them, or 10 percent of all. The fact that 43 percent of all the birds taken had eaten these beetles, some of them to the extent of 16 individuals, shows a decided fondness for these insects, and taken with the fact that 5 stomachs contained Cicindelids or tiger beetles forms a rather strong indictment against the bird.

Grasshoppers and crickets formed 6 percent of the whole food, a larger percentage than in any of the other 7 species. The aggregate for all other insects is 4 percent, and the most important kinds are wasps and their allies. As this bird has often been seen capturing insects on the wing¹ it is probable that the wasps were taken in that way.

¹See Merriam, Bull. Nuttall Ornith. Club, Vol. III, July, 1878, p. 126; also Forest and Stream, Vol. IX, January 17, 1878, p. 451.

The vegetable food of the Redhead presents considerable variety, and shows some points of difference from that of the other woodpeckers. The following is the list of substances identified:

Grain:	Fruit—Continued.
Corn.	Apples.
Fruit:	Pears.
Dogwood berries (<i>Cornus candidissima</i> and <i>C. florida</i>).	Unidentified.
Huckleberries (<i>Gaylussacia</i>).	Miscellaneous:
Strawberries (<i>Fragaria</i>).	Sumac seeds (<i>Rhus copallina</i> and <i>R.</i> <i>glabra</i>).
Blackberries or raspberries (<i>Rubus</i>).	Ragweed seeds (<i>Ambrosia</i>).
Mulberries (<i>Morus</i>).	Pigweed seeds (<i>Chenopodium</i>).
Elderberries (<i>Sambucus</i>).	Acorns (<i>Quercus</i>).
Wild black cherries (<i>Prunus serotina</i>).	Seeds unidentified.
Choke cherries (<i>Prunus virginiana</i>).	Galls.
Cultivated cherries.	Flower anthers.
Wild grapes (<i>Vitis cordifolia</i>).	Rubbish.

Corn was found in 17 stomachs, collected from May to September, inclusive, and amounted to more than 7 percent of all the food. While it seems to be eaten in any condition, that taken in the late summer was in the milk, and evidently picked from standing ears. This being the largest percentage of grain shown by any of the 7 species corroborates some of the testimony received, and indicates that the Redhead, if sufficiently abundant, might do considerable damage to the growing crop, particularly if other food was not at hand. While the fruit list is not so long as in the case of the Flicker, it includes more kinds that are, or may be, cultivated; and the quantity found in the stomachs, a little more than 33 percent of all the food, is greater than in any of the others. Strawberries were found in 1 stomach, blackberries or raspberries in 15, cultivated cherries in 2, apples in 4, and pears in 6. Fruit pulp was found in 33 stomachs, and it is almost certain that a large part of this was obtained from some of the larger cultivated varieties. Seeds were found in but few stomachs, and only a small number in each.

RED-BELLIED WOODPECKER.

(*Melanerpes carolinus*.)

The Red-bellied Woodpecker is a more southern species than any of the others treated in this bulletin. It is not known to breed north of the Carolinian fauna, and is abundant in Florida and the Gulf States. Curiously enough it sometimes migrates north of its breeding range to spend the winter.

Only 22 stomachs of this species have been obtained by the division. These were collected in 9 States, ranging from Florida to Michigan and from Maryland to Kansas, and in every month except April, June, and July. An examination of their stomachs shows: animal matter (insects)

26 percent and vegetable matter 74 percent. A small quantity of gravel was found in 7 stomachs, but was not reckoned as food. Ants were found in 14 stomachs, and amounted to 11 percent of the whole food. Adult beetles stand next in importance, aggregating 7 percent of all food, while larval beetles only reach 3 percent. Caterpillars had been taken by only 2 birds, but they had eaten so many that they amounted to 4 percent of the whole food. The remaining animal food is made up of small quantities of bugs (*Hemiptera*), crickets (*Orthoptera*), and spiders, with a few bones of a small tree frog found in 1 stomach taken in Florida.

Dr. B. H. Warren states that the stomachs of 3 Red-bellied Woodpeckers captured in winter in Chester and Delaware counties, Pa., contained black beetles, larvæ, fragments of acorns, and a few seeds of wild grapes. The stomachs of 8 adults from the St. Johns River, Florida, contained red seeds of 2 species of palmetto, but no insects. Two additional stomachs from the same locality contained palmetto berries, fragments of crickets (*Nemobius* and *Oracharis saltator*), a palmetto ant (*Camponotus escuriens*), and numerous joints of a myriapod, probably *Julus*.¹

Dr. Townend Glover found in the stomach of a Red-bellied Woodpecker killed in December "pieces of acorns, seeds, and gravel, but no insects. Another, shot in December, contained wing-cases of *Buprestis*, and a species of wasp or *Polistes*, acorns, seeds, and no bark. A third, shot in May, was filled with seeds, pieces of bark, and insects, among which was an entire *Lachnosterna*, or May bug."²

The vegetable food of the Red-bellied Woodpecker contained in the 22 stomachs examined by the division consisted of the following seeds and fruits:

Grain:

Corn.

Fruit:

Mulberries (*Morus rubra*).

Wild grapes (*Vitis cordifolia*).

Virginia creeper (*Parthenocissus quinquefolia*).

Elderberries (*Sambucus canadensis*).

Rough-leaved cornel (*Cornus asperifolia*).

Fruit—Continued.

Saw palmetto (*Sabal serrulata*).

Holly (*Ilex opaca*).

Wild sarsaparilla (*Aralia nudicaulis*).

Bayberries (*Myrica cerifera*).

Pine (*Pinus echinata*).

Poison ivy (*Rhus radicans*).

Ragweed (*Ambrosia* sp.).

Corn was found in only 2 stomachs. The other items were well distributed, and none of them appear to be specially preferred, unless it may be the poison ivy, which was found in 6 stomachs, and amounted to nearly 12 per cent of the whole food. Although 8 of the 22 birds were collected in Florida, no trace of the pulp of oranges was discovered, but that oranges are eaten by them is shown by the following interesting notes.

¹ Birds of Pennsylvania 2d ed., 1890, pp. 174, 175.

² U. S. Agric. Rept. for 1865, 1866, p. 38.

Dr. B. H. Warren states that in Florida the Red-bellied Woodpecker is commonly known as 'Orange Sapsucker' and 'Orange Borer.' Dr. Warren collected 26 of these woodpeckers in an orange grove near Volusia and found that 11 of them contained orange pulp. Three contained nothing else; the others had eaten also insects and berries.

Corroborating Dr. Warren's account, Mr. William Brewster states that at Enterprise, Fla., in February, 1889, he saw a Red-bellied Woodpecker eating the pulp of a sweet orange. Mr. Brewster states that the woodpecker attacked the orange on the ground, pecking at it in a slow and deliberate way for several minutes. On examining the orange it was found to be decayed on one side. "In the sound portion were three holes, each nearly as large as a silver dollar, with narrow strips of peel between them. The pulp had been eaten out quite to the middle of the fruit. Small pieces of rind were thickly strewn about the spot." Upon searching closely he discovered several other oranges that had been attacked in a similiar manner. All were partially decayed and were lying on the ground. He was unable to find any on the trees which showed any marks of the woodpecker's bill.¹

Mr. Benjamin Mortimer, writing of the same bird at Sanford, Fla., says:

During February and March, 1889, while gathering fruit or pruning orange trees, I frequently found oranges that had been riddled by this woodpecker and repeatedly saw the bird at work. I never observed it feeding upon fallen oranges. It helped itself freely to sound fruit that still hung on the trees, and in some instances I have found ten or twelve oranges on one tree that had been tapped by it. Where an orange accidentally rested on a branch in such a way as to make the flower end accessible from above or from a horizontal direction the woodpecker chose that spot, as through it he could reach into all the sections of the fruit, and when this was the case there was but one hole in the orange. But usually there were many holes around it. It appeared that after having once commenced on an orange, the woodpecker returned to the same one repeatedly until he had completely consumed the pulp, and then he usually attacked another very near to it. Thus I have found certain clusters in which every orange had been bored, while all the others on the tree were untouched. An old orange grower told me that the "Sapsuckers," as he called them, never touch any but very ripe oranges, and are troublesome only to such growers as reserved their crops for the late market. He also said that it is only within a very few years that they have shown a taste for the fruit; and I myself observed that, although Red-bellies were very common in the neighborhood, only an individual, or perhaps a pair, visited any one grove.²

¹ The Auk, Vol. VI, 1889, pp. 337-338.

² The Auk, Vol. VII, 1890, p. 340.

YELLOW-BELLIED WOODPECKER OR SAPSUCKER.*(Sphyrapicus varius.)*

This species is probably the most migratory of all our woodpeckers, breeding only in the most northerly parts of the United States, and in some of the mountains farther south. In the fall it ranges southward, spending the winter in most of the Eastern States. It is less generally distributed than some of the other woodpeckers, being quite unknown in some sections and very abundant in others. For instance, Dr. C. Hart Merriam states that in the Adirondack region during migration it



FIG. 4.—Yellow-bellied Woodpecker or Sapsucker.

outnumbers all other species of the family together, and throughout the summer is second in numbers only to the Hairy Woodpecker; and at Mount Chocorua, New Hampshire, Mr. Frank Bolles found it the most abundant species. In Minnesota also it is very common. On the other hand, near my home in Massachusetts only two or three were observed each year; and during a residence of eight years in Iowa it was noted only three or four times.

It is to this species that the term 'Sapsucker' is most often and most justly applied, for it drills holes in the bark of certain trees and drinks the sap. It feeds also on cambium, insects, and wild fruits and berries.

In writing of the habits of these woodpeckers in northern New York in 1878, Dr. Merriam states:

They really do considerable mischief by drilling holes in the bark of apple, thorn-apple, and mountain ash trees in such a way as to form girdles of punctures, sometimes 2 feet or more in breadth (up and down), about the trunks and branches. * * * The holes, which are sometimes merely single punctures, and sometimes squarish spaces (multiple punctures) nearly half an inch across, are placed so near together that not unfrequently they cover more of the tree than the remaining bark. Hence, more than half of the bark is sometimes removed from the girdled portions, and the balance often dries up and comes off. Therefore it is not surprising that trees which have been extensively girdled generally die, and mountain ash are much more prone to do so than either apple or thornapple trees, due, very likely, to their more slender stems. The motive which induces this species to operate thus upon young and healthy trees is, I think, but partly understood. It is unquestionably true that they feed, to a certain extent, both upon the inner bark and the fresh sap from these trees, but that the procurement of these two elements of sustenance, gratifying as they doubtless are, is their chief aim in making the punctures I am inclined to dispute. As the sap exudes from the newly-made punctures, thousands of flies, yellow jackets, and other insects congregate about the place, till the hum of their wings suggests a swarm of bees. If, now, the tree be watched, the woodpecker will soon be seen to return and alight over the part of the girdle which he has most recently punctured. Here he remains, with motionless body, and feasts upon the choicest species from the host of insects within easy reach. * * * In making each girdle they work around the trunk, and from below upwards, but they may begin a new girdle below an old one. They make but few holes each day, and after completing two or three remain over the spot for some little time, and as the clear fresh sap exudes and trickles down the bark they place their bill against the dependent drop and suck it in with evident relish—a habit which has doubtless given rise to the more appropriate than elegant term Sapsucker, by which they are commonly known in some parts of the country. I have several times watched this performance at a distance of less than 10 feet, and all the details of the process were distinctly seen, the bird looking at me, meanwhile, 'out of the corner of his eye.' When his thirst is satisfied he silently disappears, and as silently returns again, after a few hours, to feast upon the insects that have been attracted to the spot by the escaping sap. This bird, then, by a few strokes of its bill, is enabled to secure both food (animal and vegetable) and drink in abundance for an entire day; and a single tree, favorably situated, may suffice for a whole season.¹

The late Frank Bolles has published some interesting detailed observations respecting the food habits of the Sapsucker. His conclusions are:

That the Yellow-bellied Woodpecker is in the habit for successive years of drilling the canoe birch, red maple, red oak, white ash, and probably other trees, for the purpose of taking from them the elaborated sap, and in some cases parts of the cambium layer; that the birds consume the sap in large quantities for its own sake and not for insect matter which such sap may chance occasionally to contain; that the sap attracts many insects of various species, a few of which form a considerable part of the food of this bird, but whose capture does not occupy its time to any-

¹ Bull. Nuttall Ornith. Club, Vol. IV, January, 1879, pp. 3-5.

thing like the extent to which sap drinking occupies it; * * * that the forest trees attacked by them generally die, possibly in the second or third year of use; that the total damage done by them is too insignificant to justify their persecution in well-wooded regions.¹

Mr. Bolles shot 8 Sapsuckers in July and August, 1890. Their stomachs "were well filled with insects." Some of these were examined by Mr. Samuel H. Scudder, who states:

The insects in the different stomachs are in all cases almost exclusively composed of the harder chitinous parts of ants. In a cursory examination I find little else, though one or two beetles are represented, and No. 4 must have swallowed an entire wasp of the largest size, his head and wings attesting thereto.²

In a subsequent article Mr. Bolles gives the result of an attempt to keep several young Sapsuckers alive on a diet of dilute maple sirup. Unfortunately for the experiment, the birds obtained and greedily devoured numerous insects attracted to the cage by the sirup. How many of the insects were eaten was not known, but all of the birds died within four months. Examination of their bodies showed fatty degeneration of the liver—a condition said to be usual in cases of starvation. Mr. Bolles states:

The most probable cause of this enlargement of the liver, which seems to have been the reason for the death of the 3 Sapsuckers, was an undue proportion of sugar in their diet. In a wild state they would have eaten insects every day and kept their stomachs well filled with the chitinous parts of acid insects. Under restraint they secured fewer and fewer insects, until, during the last few weeks of their lives, they had practically no solid food of any kind.³

Mr. Bolles has thus proved by experiment that concentrated sap (saturated with sugar) is not sufficient to sustain life, even with the addition of a small percentage of insects. The logical inference is that sap, while liked by the birds and consumed in large quantities, holds a subordinate place as an article of food.

The Yellow-bellied Woodpecker is represented in the collection by 81 stomachs, distributed rather irregularly through the year. None were taken in February, March, or November, and only a few in January, June, and December; the great bulk were collected in April, August, September, and October. They were obtained from 15 States, the District of Columbia, and Nova Scotia. All were from the Northern States, except a few from North Carolina, Virginia, and the District of Columbia. Unlike any of the preceding species the vegetable element of the food here exactly equals the animal part. The insect matter was made up of ants, wasps, beetles, flies, bugs, grasshoppers, crickets, and mayflies. Some spiders also were present. Of the whole food, 36 percent consisted of ants, a higher percentage than in any other woodpecker except the Flicker. Beetles amounted to 5 percent, and do not appear to be a favorite food. Flies (*Diptera*) in various forms were

¹ The Auk, Vol. VIII, July, 1891, p. 270.

² The Auk, Vol. VIII, July, 1891, p. 269.

³ The Auk, Vol. IX, April, 1892, p. 119.

eaten in larger numbers than by any of the others. Among them were several long-legged crane flies (*Tipulids*). Spiders were eaten to a small extent only, and most of these were phalangiers or 'daddy-longlegs,' which, taken with the crane flies, would indicate a slight preference for long-legged prey. Bugs, wasps, caterpillars, crickets, and mayflies collectively amount to about 6 percent, no one of them reaching any very important figure. Prof. Samuel Aughey examined 5 stomachs of the Yellow-bellied Woodpecker in Nebraska, all of which contained grasshoppers. The number in each stomach varied from 15 to 33.

Mr. William Brewster states that at Umbagog Lake, Maine, "After the young have hatched, the habits of the Yellow-bellied Woodpecker change. From an humble delver after worms and larvæ, it rises to the proud independence of a flycatcher, taking its prey on wing as unerringly as the best marksman of them all. From its perch on the spire of some tall stub it makes a succession of rapid sorties after its abundant victims, and then flies off to its nest with bill and mouth crammed full of insects, principally large Diptera."¹

The vegetable food of the Sapsucker is varied. The following fruits and berries were found in the stomachs:

Fruit:

Dogwood berries (*Cornus florida*).
 Black alder berries (*Ilex verticillata*).
 Virginia creeper berries (*Parthenocissus quinquefolia*).
 Wild black cherries (*Prunus serotina*).
 Blackberries or raspberries (*Rubus*).
 Unidentified.

Miscellaneous:

Poison ivy seeds (*Rhus radicans*).
 Mullein seeds (*Verbascum thapsus*).
 Juniper berries (*Juniperus virginiana*).
 Buds.
 Seeds unidentified.
 Cambium.
 Rubbish.

The quantity of fruit found in the stomachs formed 26 percent of the entire food, but the only kinds identified that might possibly be cultivated were blackberries and raspberries, and these were in only 2 stomachs. Unidentifiable fruit pulp was found in 12 stomachs. Miscellaneous seeds to the amount of 5 percent complete the list of substances eaten by this species. Poison ivy seeds were found in only 1 stomach, and most of the other things were distributed in about the same proportion.

Dr. Merriam informs me that in the fall in northern New York the Sapsuckers feed on ripening beechnuts, the small branches bending low with the weight of the birds while picking the tender nuts.

¹ Bull. Nuttall Ornith. Club, Vol. I, 1876, No. 3, p. 69.

GREAT PILEATED WOODPECKER.

(*Ceophlæus pileatus*.)

Excepting the Ivory Bill this is the largest woodpecker in the United States, where it inhabits most of the heavily wooded districts. It is shy and retiring, seldom appearing outside of the forests, and difficult to approach even in its favorite haunts. Its large size, loud voice, and habit of hammering upon dead trees render it conspicuous. Its strength is marvelous, and one unacquainted with it can scarcely credit a bird with such power of destruction as is sometimes shown by a stump or dead trunk on which it has operated for ants or boring larvæ.

Only 23 stomachs of the Pileated Woodpecker have been obtained; all taken in the months of October, November, December, and January, and collected from 6 States, the District of Columbia, and Canada (including New Brunswick). Fifty-one percent of the contents of these stomachs consisted of animal matter or insects; 49 percent of vegetable matter. The insects were principally ants and beetles, with a few of some other orders. The ants were mostly of the larger species that live in decaying wood. A large proportion of the beetles were in the larval form, and all were of the wood-boring species. There were also a few caterpillars, also wood-borers, a few plant lice, several cockroaches of the species that live under the bark of dead trees, a few white ants and a few flies, with one spider.

The gizzard of a Pileated Woodpecker shot by Dr. Merriam in the Adirondacks, April 25, 1882, contained hundreds of large ants and no other food. Six stomachs, collected by Dr. B. H. Warren on the St. Johns River in Florida, contained numerous palmetto ants (*Campanotus escuriens*), and remains of other ants, several larvæ of a Prionid beetle (*Orthosoma brunnea*), numerous builder ants (*Cremastogaster lineolata*), one larva of *Xylotrechus*, and one pupa of the white ant (*Termes*). The insects were determined under Prof. C. V. Riley.¹

Seeds and berries of the following plants were found in the stomachs examined by the division :

Sourgum (*Nyssa aquatica*).
 Flowering dogwood (*Cornus florida*).
 Black haw (*Viburnum prunifolium*).
 Cassena (*Ilex cassine*).
 Hackberry (*Celtis occidentalis*).
 Persimmon (*Diospyros virginiana*).
 Wild grapes (*Vitis cordifolia*).

Virginia creeper (*Parthenocissus quinquefolia*).
 Greenbrier (*Smilax rotundifolia* and *S. glauca*).
 Sumac (*Rhus copallina*).
 Poison sumac (*Rhus vernix*).
 Poison ivy (*Rhus radicans*).

¹ Birds of Pennsylvania, 2d ed., 1890, p. 177.

In addition to the 7 species of woodpeckers whose food has been already discussed, 57 stomachs have been examined, belonging to 12 species and subspecies, mostly from the southern and western parts of the United States and British Columbia, as follows:

	Stomachs.
Nuttall's Woodpecker (<i>Dryobates nuttallii</i>).....	7
Red-cockaded Woodpecker (<i>Dryobates borealis</i>).....	12
Baird's Woodpecker (<i>Dryobates scalaris bairdi</i>).....	3
Gilded Flicker (<i>Colaptes chrysoides</i>).....	3
Red-shafted Flicker (<i>Colaptes cafer</i>).....	11
Northwestern Flicker (<i>Colaptes cafer saturator</i>).....	5
California Woodpecker (<i>Melanerpes formicivorus bairdi</i>).....	1
Lewis's Woodpecker (<i>Melanerpes torquatus</i>).....	3
Gila Woodpecker (<i>Melanerpes uropygialis</i>).....	1
Red-breasted Sapsucker (<i>Sphyrapicus ruber</i>).....	1
Arctic Three-toed Woodpecker (<i>Picoides arcticus</i>).....	7
Alpine Three-toed Woodpecker (<i>Picoides americanus dorsalis</i>).....	3

With such a small number of stomachs it is hardly worth while to discuss the food of each species. The Three-toed Woodpeckers (*Picoides*), however, deserve passing notice, since their food contains a larger percentage of wood-boring larvæ than any other woodpecker examined. As the food of the two species is practically the same they may be considered together. The contents of the 10 stomachs consists of: animal matter, 83 percent; vegetable matter, 17 percent. It is a question whether this should not all be considered as animal, for the vegetable portion consisted almost entirely of rotten wood and similar rubbish, probably taken accidentally, and is not in any proper sense food, the exception being in one case where a little cambium had been eaten by one individual of the Arctic Three-toed Woodpecker (*Picoides arcticus*) and a few skins of some small fruit by one Alpine Three-toed Woodpecker (*P. americanus dorsalis*). The animal food consisted of 63 per cent of wood-boring Coleopterous larvæ (beetles), 11 percent of Lepidopterous larvæ (caterpillars), probably also wood-borers, and 9 per cent of adult beetles, ants, and other Hymenopterous insects.

